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Abstract
An implantable antenna for the applications of biomedical telemetry and hyperthermia has been being widely studied in modern medical science. However, up to now, there are only few reports related to implantable antenna. Hence, the purpose of this study is to design and fabricate an implantable antenna which exhibits broadband (25%) and miniaturization for the use of implantation. In this study, a microwave dielectric ceramic substrate which possesses high dielectric constant and high quality factor (εr = 30, Q f = 35,000) [1, 2] is utilized to be the substrate of the implantable antenna, and a CPW-fed monopole twin spiral structure is adopted as the pattern of antenna. The effects of shape, length, size, substrate, superstrate materials, and their thicknesses are evaluated. An extensive study of the corresponding performance of the antennas to the change of these parameters was undertaken.
In addition, to reduce the size of this antenna, we modify the shape of the antenna to be mono-spiral structure. Although a bandwidth of 77 MHz is obtained with simulated operating frequency at 402 MHz and with the return loss of -10 dB from the mono-spiral antenna, the radiation patterns are not good monopole-like. Specifically, the radiation efficiency is 0.01% and the maximum gain value is -33 dB.
In addition, the center frequency is required to conform to the band (402 ~ 405 MHz) provided by Medical Implant Communication Services. Therefore, the results of this paper provide guidance in the design of implantable CPW-fed antennas.
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